

EDITORIAL ARTICLE.

THE DEVELOPMENT OF THE SURGERY OF THE KIDNEY, WITH SOME OF THE LESSONS CONNECTED THEREWITH.

TWENTY years ago my interest in the question of the possibility of relieving, by operative measures, certain affections of the kidneys was awakened by a post-mortem specimen of calculous kidney which came into my possession. Attached to the case was a long history of pain, exhaustive suppuration, and lumbar fistula. The possibility of interfering surgically in the case had never been seriously entertained, although in the care of the sufferer up to the time of death most eminent medical talent had been employed. This was in the early part of 1879.

The time was one of expectancy and eager hopefulness in the surgical world, but doubts, questionings, and hesitancy to let go traditional ideas and methods were equally prevalent. For twelve years already Lister had been preaching the gospel of carbolic acid, and for eight years had been smothering imaginary ærial germs with his medicated spray. It was the time when the spray machines were most numerous, and when their odoriferous, melano-uriferous clouds enveloped every wound and befogged every dressing. In the temple of *Æsculapius* the incense of carbolic acid was continually arising, nor as yet had even a faint tinge of the odor of iodoform began to be mixed with it. Mackintosh protective and the eight layers of carbolated resinous gauze, carbolated catgut, and drainage-tubing, and the 1-40 carbolic solution, these constituted the ordnance through which surgical victories were to be won.

The value of the antiseptic practice had been proven beyond the

possibility of question, but the theory of germ-infection, upon which it was based, had not yet been fully demonstrated. Even so late as December, 1879, in a debate in which many of the leading surgeons of London participated, Mr. Timothy Holmes was able to say that "no convincing proof of the germ-theory, as applied to living tissue and living phenomena, has, as far as I know, yet been offered" (Mac-Cormac, "Antiseptic Surgery," 1880, p. 58). It was not until 1881 that the observations of Ogston, on the relations of micro-organisms to surgical diseases, were published, and not until the publication of the work of Rosenbach, in 1884, and of Passet, in 1885, were the varieties and the natural history of the common micro-organisms of suppuration fully described and their identity established. These had to be preceded by the epoch-making researches of Koch on staining methods and culture media, and it was not until 1881 that his treatise, "*Zur Untersuchung von pathogenen Organismen*," was published.

General surgeons still confined their operative work mostly to excisions of tumors, osteotomies, lithotomies, amputations, and the opening of abscesses. Some of the bolder had timidly begun to experiment upon the radical cure of non-strangulated herniæ. In this very year of 1879 Macewen was about to do his first operation of this kind, and nine years were yet to elapse before Bassini should report, in March, 1888, to the Congress of Italian Surgeons, his first one hundred cases, a report which, in the light of present knowledge, we see to have finally fully established that most beneficent procedure.

Sands was still cautiously opening perityphlitic abscesses, having up to that date incised in five cases, at periods varying from twelve to twenty-one days after the advent of symptoms, for it was not until 1886 that Fitz published his paper on "Perforating Inflammation of the Vermiform Appendix, with Special Reference to its early Diagnosis and Treatment," and not until December, 1889, more than ten years, did McBurney report his first series of operations ("Experience with early Operative Interference in Cases of Disease of the Vermiform Appendix," *New York Medical Journal*, December 21, 1889), and this series included only eight cases. Later in this fruitful year of 1879 Tait was to remove his first pyosalpinx, and to do his first

cholecystotomy. These suggestive dates, which crowd upon the memory of many of us who are still engaged in active professional work, are sufficient to indicate the revolution in surgery which has occurred during the twenty years now ending. Old operations have been made safe, many formerly doubtful procedures have become established in legitimate and common practice, and a host of entirely new surgical attempts have been found feasible and useful. A new surgical literature has been created; in this country the scholarly volumes of Gross, of Agnew, and of Ashhurst have been supplanted by newer writings, books published in the tenth decade of the century, but really inspired and made necessary by the achievements of the ninth decade. Surgical papers, formerly diffused through the pages of journals devoted to general medicine, or in hospital or society reports, have now become so important and numerous that in the English as well as in the German, the French, the Russian, the Italian, and the Spanish tongues, a host of periodicals, both monthly and weekly, are devoted exclusively to them.

Since 1879 the problem of surgical effort has been completely transformed; then it was, "How shall the air be purified?" now it is, "How shall the surgeon cleanse his hands?" In place of the spray-producer has arisen the rubber glove; possibly by the end of another decade both will be companions on the same shelf.

In 1879 the magnificent temples of marble and glass which in 1899 have become common, being recognized as essential to supply surroundings most favorable for securing the asepsis of the period, had not yet been planned, nor was their necessity realized until the more complete understanding of the habitats and the natural history of pathogenic micro-organisms had been arrived at. Perhaps even now the last word has not been said as to the arrangement and construction of these buildings. Is there sufficient of advantage in erecting costly structures to contain amphitheatres that will seat from three to five hundred spectators, when the number of those who can get near enough to the patient to realize, much less to see, the details of what is being done in their arenas can scarcely be one-tenth of that number? Are not these theatres the lingering remnants of the

days when the spectacular element played a large part in the public work of a surgical teacher? When the profession of a whole nation would gather to see a Syme incise a gluteal aneurism, or the benches of a vast amphitheatre would be crowded by physicians and students to see a Wood work against time in the amputation of a limb or the removal of a stone from the bladder. The surgeon of the closing year of the nineteenth century approaches his work in a different spirit. In his daily work he enters regions and undertakes procedures which Syme or Wood never dreamed of, and he does it with a sense of security from disaster, of certainty of a favorable after-progress, of probable accomplishment of the end sought, never enjoyed by the most eminent of his predecessors. To secure this end there is a co-operation of many hands, of assistants and nurses; there is needed long previous training in technical details, and an exact and tender conscience in the observance of those precautions by means of which the infection of the wound is guarded against. The work in its nature each time approaches that of a demonstration in a laboratory of exact science, and it is in the spirit of the scientist, rather than of the man who is to make a display of manual dexterity, that the surgeon of to-day does his work. The operating-room is merely a surgical laboratory; its walls and floors cannot be made too smooth and non-absorbent, too much exactness cannot be exercised in removing from it every dust-catching apparatus or pendant fixture; its furnishings cannot be too simple and easily cleansed; glass and marble, polished brass and steel, vitrified tiles, abundant water clear and sterile, the boiling kettle, and the steam-chamber, these have come to stay, at least until possibly a yet more perfect knowledge of the laws by which living cells are governed may point out simpler methods of protecting such cells from the disturbing influence of external causes during the healing process. Meanwhile is it not to be expected that this spirit of scientific precision and of earnest routine work which now characterizes all surgical effort will more and more eliminate the amphitheatrical element from it, and that in the future, even in institutions devoted to teaching, it will become an unthinkable thing that the number of spectators who shall be permitted to gather about an "*opéré*" shall exceed those who are re-

quired to assist in the work or who may so closely approach the field of work as to be able to see clear enough the steps which are being taken to derive some benefit therefrom? Out of these conditions which I have hinted at, rather than described, which have made the surgeon a laborious scientist rather than a dextrous actor, developed with steady growth RENAL SURGERY, a branch of surgical effort which is surpassed by none other in the degree to which it calls to its aid, for purposes of diagnosis, diverse resources of physical science; in the amount of painstaking, patience, and accuracy demanded throughout every step of its conduct; in the extent to which the observance of the new tenets of surgical technique means success, and their neglect entails disaster; while at the same time, to a notable degree, all its processes lend themselves but little to the spectacular nor have any reward for the distant on-looker. The development of this branch of surgical effort it is my present task to trace.

The incision of a fluctuating tumor pointing in the loin, possibly of kidney origin, or the dilatation of a lumbar fistula and the extraction from its bottom of a calculus, these constituted the sum total of the efforts at surgical intervention upon the kidneys until the advent of the present generation. As to the removal of a kidney, Rayer, in 1840, in his "Maladies des Reins" (t. iii, p. 240), summed up the wisdom of the ages in the sentence, "It would be folly to attempt such an operation" ("*Ce serait folie de tenter chez l'homme atteint de calculs une telle opération*"). Even the proposal to cut down upon the kidney through healthy overlying planes of tissue, to remove from its interior calculi, or to liberate accumulated pus, had no serious place in surgery. The accounts of the cases of the "free archer of Bagnolet,"¹ and of Hobson, the English consul at

¹ An account of his case is given by Mezeray in his "History of France." The date of its occurrence is uncertain, but it was previous to the time of Paré (1510-85). The story goes that this archer was under sentence of death for crime; but at the request of the Faculty of Paris was delivered up to them for experiment, as it was known that he had nephritic trouble. The kidney was cut down upon (so the account goes) and a stone extracted. The patient recovered and lived many years after in good health—*Dictionnaire des Sciences Médicales*, Paris, 1819, xxxv, Article, "Nephrotomie."

Venice,¹ of each of whom it was related that under peculiar circumstances a kidney had been cut down upon, stones extracted, and recovery followed, remained simply as *curiosa chirurgica*. They provoked no imitators, and awoke only remarks upon the temerity of the operators and the indefensibility of such operations.

From the experiences of surgeons dealing with ovarian tumors, however, a suggestion as to possible work upon the kidney finally came. In 1858, Spencer Wells, and in 1862, Thomas Keith began their careers as ovariologists, and by 1870 the total number of ovariectomies by all operators in Great Britain had already exceeded one thousand. In this country, contemporary with these and working in the same field with equal boldness and success, were Atlee, Kimball, Dunlap, Peaslee, and others. In 1868 Peaslee found, after having removed a supposed solid ovarian tumor, that it was an enlarged kidney that he had taken away. Although peritonitis carried off the patient on the third day thereafter, it was noticed that an adequate urinary secretion was furnished by the remaining kidney up to the time of death.

Wells, too, at about the same time, after the removal of an ovarian cyst, found that he had in addition taken away a healthy kidney, which was inseparably adherent to it. This patient also died on the third day, but no trouble from non-elimination of the urine was experienced. Finally, however, at Heidelberg, was worked out by most careful and rigorously guarded experimentation the physiological fact that but one healthy kidney was required for the excretory needs of the body, and, further, the surgical fact was established that the methodical removal of a kidney from the human subject involved no technical difficulties that could not readily be overcome.

¹ This case occurred during the last century. A certain Mr. Hobson, English Consul at Venice, having insisted that Dominicus de Marchetti, a famous physician of Padua, should do something to relieve him of his sufferings, that physician cut down as far as the kidney one day, and the next finished by cutting into the kidney and extracting two or three calculi. The patient recovered and lived for years after with a urinary fistula, but with permanent relief from his pain.—*Bernard*, Lond. Philosoph., Trans. xviii, 333.

For a year and a half had the life of Margaretha Kleb been made miserable by a ureteral fistula, opening upon the anterior abdominal surface in the scar of a wound made for an ovariectomy, combined with an hysterectomy, in the course of which operation the left ureter had been wounded. In July, 1869, she appealed to Simon, then professor of Surgery in the University of Heidelberg, for relief. The condition that the patient presented satisfied him that relief was to be found only in the suppression of the primary source from which the urine came. Possibly at the present day an attempt at reimplantation of the ureter into the bladder would first have been made. But it is by no means certain that such a procedure, even had it been successful, would have been the best thing for the patient, for it has occurred to surgeons in these later times to find themselves compelled to finally extirpate for progressive pyelonephritis a kidney whose ureter had been satisfactorily reimplanted in the bladder months before. (See Lange's case, *ANNALS OF SURGERY*, October, 1899, p. 513.) Whatever criticism may be made, the fact remains that in this instance it was eminently true that "the end crowned the work," for, when at last the kidney was removed, the convalescence was undisturbed and full restoration to health, comfort, and usefulness followed. It is easy for us, twenty years later, to approach a nephrectomy confidently and unhesitatingly. All its problems have been worked out and demonstrated by the experience of hundreds of cases in the hands of many operators. Not so, however, with Simon at this time.

It was absolutely new ground. Would the remaining kidney be competent to the needs of the body? Could the repair of the ligated renal artery, cut off so close to the great arterial conduit, the abdominal aorta, be relied upon to stand the blood-pressure after the absorption of the ligature? Might not emboli become detached from the thrombus in the renal vein, and floating into the general blood-current provoke lesions in distant organs? Could the primary hæmorrhage be kept under control? could wounds and infection of the peritoneum be escaped? And, finally, could the deep and extensive wound-cavity be conducted to a sound healing?

With these questions unsettled, was it justifiable to subject a fellow human being to a procedure which involved them all? Not until thirty dogs had been nephrectomized by Simon and his assistants, and it had been demonstrated by the experience gained in these vivisections that in each of these points surgery was competent to secure safety, did Simon venture to advance to the supreme test upon the human being. "*Was nun aber für den Hund gilt, das scheint mir auch für den Menschen gelten zu müssen*" ("Chirurgie der Nieren," 1ste Theil, p. 12) are Simon's words in describing this part of his work.

What friend of man and of animals is there who will venture to claim that the subjection of these dogs to these experiments was otherwise than a most humane and praiseworthy act? The advantage to mankind which has proceeded from the sacrifice of these few dogs has been incalculable. Was the act a justifiable one, and is the resort of surgeons and physiologists to similar practices in the pursuit of knowledge or of manipulative skill to be condemned? Ask Margaretha Kleb, or any of the thousands of individuals who, since the publication to the world of the happy outcome of her case, have been relieved of the most atrocious sufferings and imminent death by the invasion of the surgeon's knife into the hitherto forbidden region of the kidney! It is but recently that a gentleman, the picture of health, whom I did not recognize, called upon me, and stated that his object was simply to express to me his sense of grateful obligation and appreciation for service that I had rendered him. When he had recalled himself to my memory, I found that it was a man whom I had seen but once, and that in consultation. Then he was wasted to a skeleton after many weeks' persistence of that complex of rigors and fever and sweating and malnutrition, which speaks to the surgeon so positively of internal suppuration and septic absorption. It had been my good fortune simply, as the result of my examination, to point out a kidney as the seat of this disturbance, and to urge the necessity of its exposure and incision. This had since been done by another hand, and with a result that was marvellous.

It was a veritable resurrection. And what is more rare than recovery, with returned health there remained a lively appreciation of

the guide which had pointed out to him the way to health. But it was to Simon, and to those who followed him in the difficult work of experimental investigation, that he was really indebted. Shall we ask this man, whether thirty dogs are too high a price to pay for thirty years of health and working power for a man?

The "ethics of vivisection" is a term most happily used by a recent writer in the *Edinburgh Review* to characterize the sum of the questions which in these later times have been made to gather around the propriety of subjecting lower animals to pain, maiming, or death for purposes of physiological research or surgical experiment for the benefit of man, for ethics involves not only the consideration of one's moral obligations as to the rights of others, but also of his duty in respect to himself. And what is due to man should receive as full consideration at all times as what is due to the lower orders of animals. All life is sacred, and no one feels this more keenly than the physician, who is of all men the high-priest of life. And yet the order of nature is that life, or the products of life, shall be given to perpetuate life, the lower for the higher, the older for the younger, the mature for the new-born. Is not life everywhere the same, an eternal, indestructible force, dependent for the character of its manifestations upon the quality of the material conditions by which it is environed? When these conditions are such as are no longer responsive to its stimulus, death is said to have occurred, but is there any less of life in the universe? The living cell, the biological molecule that it is, is the unit of life. And whether in the elements of that unit there be potentialities degradingly low or infinitely great, the force with which it is endowed that makes it to attain to all that is possible for it, must be essentially the same in all, and this force is what men call LIFE. But every living cell, be it vegetable or animal, contains within itself the elements of its own dissolution, sooner or later, and by its dissolution presents materials to be appropriated by other still living cells, and so the same elements anew enter into the cycle of life, and the endless procession of life goes on, immortality as brought to light by science! In this endless chain of transformations that is going on in Nature instinct, reason, custom, religion, alike, all unite to sanction

the use of the lower order of living things for the maintenance of the higher, often, indeed, the very organization of the higher makes it imperative that such should be the case. Every living herb cropped by a grazing animal, every tree cut down for fuel, every animal slain for food, every bleeding victim laid upon a sacrificial altar is an example of this righteous subjection of the lower to the higher forms of life. To use the words of the reviewer already referred to, if medicine is still further "to improve and take its place as a science, it can only be by toiling along the stony and weary path of experimental investigation. Nor need we fear that too many people will press into this path. Human nature is mostly indolent and ease-loving. Research by experiment is difficult and costly, it requires almost infinite patience, infinite hopefulness. It brings in a mere pittance of income; it requires a degree of absorption which prevents any other work being done. There need be no fear of too many people undertaking it." But may not this right to use the lower animals be abused, may not recklessness as to suffering inflicted be displayed by thoughtless or callous experimenters? Doubtless so, but it is far less in amount than the representation of ardent antivivisectionists would lead the public to believe, and for its correction an enlightened and sensitive professional sentiment is entirely adequate.

The example of Simon received no imitators for a year and a half, until finally, in March, 1871, Von Bruns, in a case of left lumbar urinary fistula, with pyonephrosis and calculous formation, resulting from a gunshot wound, in the person of a German officer, extirpated the diseased kidney. Death followed in a few hours, and at the autopsy the remaining kidney was found to be also the seat of multiple abscesses. Five months later, Simon, in August, 1871, for the first time in the history of mankind, removed a kidney on account of calculous disease pure and simple. The patient was a woman, thirty years of age, who for twelve years had been suffering in an extreme degree from the pains and disabilities incident to that condition. A resident of Savannah, Georgia, she crossed the Atlantic to put herself under the care of Simon, by whom, on the 8th of August, 1871, the affected kidney was safely removed. In his own account of the

operation Simon confesses that he approached it with very great anxiety. All previous authority had condemned such a procedure in such a condition; never before had it been attempted; not until the operation was happily finished did the apprehension leave him that he might yet find himself confronted by the conditions which his predecessors had described as insurmountable.

For three weeks the convalescence of the patient proceeded without disturbance; she was free from pain, her temperature was normal, the urinary secretion was ample, her appetite was good, the wound cavity had filled up and contracted until it was now insignificant. Simon, however, shared in an unusual degree in that spirit of the older surgeons which prompted them to examine every cavity and feel every surface with their own fingers. They called the practice training their "*tactus cruditus*." No unfortunate patient could have a cavity opened or a wound made without the by-standing surgeons being invited to put their fingers into it. And the omission to extend such an invitation was a serious breach of professional courtesy. The boldness and enterprise of this Heidelberg surgeon had carried him in this direction further than most surgeons. He had passed his hand and forearm through the anal sphincter and along the large intestine until he could feel the kidneys and liver of his patients; he had made a practice of dilating the female urethra with his forefinger and carrying the forefinger into the bladder, and by it had guided a catheter into many a ureter. Where his fingers had been previous to his approach to the bed of his now fully convalescent nephrectomized patient on this the twenty-first morning after the operation who can say. It is quite certain, however, that no special precautions to make them aseptic had been taken. The vexed questions as to the relative merits of alcohol and sublimate solution, permanganate and oxalic acid, and chlorinated lime and carbonate of soda, or as to whether the surgeons should wear cotton or rubber gloves, had not yet begun to trouble the surgical mind. So much the worse for this little woman from Georgia and her dreams of future health. As the dressings were being changed in the presence of Simon, the temptation for him to explore the wound cavity with his finger was too much for him, and in it went.

He says, in his account of it, that he explored it very carefully with his *little* finger. All the same, within a few hours the symptoms of general septic infection declared themselves by a chill and a rise of temperature to 103.5° F. (39.4° C.). For some days the battle between the body cells and the invading micro-organisms continued until both pleural cavities and the peritoneum were filled with pus, when, on the tenth day, death supervened.

Simon, himself, died from an aneurism of the thoracic aorta, in August, 1876, without again having occasion to resort to nephrectomy, but the seed which he had sown quickly sprang up and brought forth a most abundant harvest, more particularly when the possibilities which antiseptics opened to the surgical world began to be realized. Up to 1879, when I made a search through literature for cases bearing upon the one which I have already mentioned as having engaged my interest at that date, I was able to find reports of only fifteen cases of kidney removal, and in more than one-half of these the operator did not know that it was a kidney that he was removing when he did it. Six years later the number that Gross (*American Journal of the Medical Sciences*, July, 1885) was able to gather was 233. Since the latter date individual cases have ceased to be counted, the procedure has become as much an established operation of surgery as the amputation of a limb or the relieving of a strangulated hernia, and there are now many individual operators who count their cases of nephrectomy by the score. Simon did more than demonstrate by his vivisections and by his operations upon the human subject that the kidneys were within the range of surgical effort; before his untimely death he had prepared and published two parts of a systematic treatise entitled "*Chirurgie der Nieren*," the first book of this character in any language. In these were discussed first the physiological questions involved in such work; then wounds, calculi, suppuration, and hydro- and pyonephrosis. For a third part he had reserved cysts, tuberculosis, and movable kidney; but this he did not live to accomplish. It was not until ten years later that other authors began to publish systematic treatises on surgical diseases of the kidney, and then appeared in rapid succession the volumes of Morris ("*Surgical Diseases of the Kidneys*,"

1885, 12mo, 548), Bruce Clark ("Diseases of the Kidney Amenable to Direct Surgical Interference," 1886, 8vo, 176), Newman ("Diseases of the Kidney Amenable to Surgical Treatment," 1888, 8vo, 472), Tuffier ("Études expérimentales sur la Chirurgie du Rein," 1889, 8vo, 166), Knowsley Thornton ("Surgery of the Kidneys," 1890, 8vo, 102), and finally that of Küster ("Die chirurgischen Krankheiten der Nieren," I. Hälfte, 1896, 8vo, 274), the first half only of which has as yet appeared.

The two indications for which Simon first performed nephrectomy still remain in the list of the conditions for which the surgeons of the present day resort to it, but with modifications that later experience has introduced. About wounds of the ureter a considerable special surgery has since that date arisen. While by the various devices of uretero-ureterostomy and of bladder implantation the flow of urine through its natural ureteral channel has been and may be restored in the greater number of instances in which wounds of that conduit occur, there still remain certain cases in which neither of these procedures is practicable, or in which it has been neglected until by an ascending infection the kidney itself has become the seat of a suppurative process, while the offensive ureteral fistula persists. Provided the other kidney is known to be sound, the removal of the one whose ureter has been damaged is the proper thing to do. So also in those closely allied cases in which, by obstruction to the ureter, the kidney has been dilated into a huge sac-like urinal, which, though emptied by incision, degenerates into a persistent urinary fistula by reason of the continued ureteral obstruction; in these cases, too, what remains of the kidney should be extirpated.

Whether a stone-bearing kidney should be excised or not depends largely upon the condition of the kidney substance itself. Experience has shown that in the earlier period of stone in a kidney, before the kidney has become the subject of pyogenic infection, the organ may be exposed, split open, the stones removed, and sound healing with restitution to a healthy condition follow, in the great majority of the cases in which such a procedure is resorted to. To remove such a kidney, therefore, is not justifiable. Not so, however, when sup-

puration has already supervened, and a pyonephrosis as well as a nephrolithiasis has to be dealt with. A possible temporary advantage may be secured even in such cases by an incision of the suppurating kidney, removal of the stone, and drainage, but ultimately in almost all such cases extirpation of the kidney must be done.

The question of the early diagnosis of a renal calculus and of promptness of interference as soon as a diagnosis is made is thus seen to be of more than ordinary importance. For upon it depends not only the removal of the foreign body with the least amount of risk to the patient, but also the possibility of retaining for the use of the body so important an organ as a kidney.

So also in the case of tuberculosis of the kidney, it is undeniable that the earlier an organ thus affected can be totally removed the better, provided that the disease is limited to the one kidney and the other kidney is competent as an excreting organ. Excision becomes a serious matter only when deferred until the local conditions have been made difficult of management by inflammatory infiltrations and adhesions and by perirenal suppuration, and the general condition of the patient has been seriously compromised by pain, profuse and long-continued suppuration, and by absorption of retained septic products. The difficulties that attend diagnosis during the earlier period when intervention promises most are many; often the kidneys are involved as a part of a diffuse tuberculosis; often both kidneys are affected, so that little of brilliancy and often much disappointment must attend surgical intervention in this class of cases. The certain march to the grave of an unrelieved tuberculous kidney, the comparatively small risk attending excision of the part or a whole of the kidney that has not yet become the seat of suppuration, in a person whose general health is still fair, makes the early detection of kidney tuberculosis so important as to warrant resort to explorative incision for the purpose of making a diagnosis whenever such symptoms of renal disturbance as polyuria, frequent urination, transitory recurring hæmaturia, and loinache appear and persist, even though pus has not yet appeared in the urine, and no tumefaction can be felt in the region of the kidney.

Unfortunately, tubercular kidneys rarely come under the surgeon's observation until after they have become the seat of suppurative processes, and the relief of the kidney abscess has become the dominating condition. Incision for the evacuation of pus and drainage must be followed at once or later, according to the judgment of the surgeon in the individual case, by extirpation of the whole tuberculous mass, kidney and all, if recovery is to be secured. The accomplishment of total extirpation in such cases may present the most formidable difficulties by reason of the dense adhesions to surrounding structures that have formed. The immediate mortality-rate of intervention in such cases is high, but should have no influence in determining the question of radical operative interference, provided the healthy condition of the remaining kidney has been ascertained. According to the statistics compiled by Bangs, two years ago (*ANNALS OF SURGERY*, January, 1898), in about one-third of the cases operated upon a lasting recovery has followed the operation, and in an additional equal proportion of cases great improvement was secured for a time. When one considers the nature of the affection, and its rapid course to a lethal termination when left to itself, a procedure which enables the surgeon to cure one-third of the cases, and greatly improve for a time another third, is certainly worthy of all praise. A better record than this can be secured only by earlier diagnosis and more prompt surgical intervention, until that time shall come, not far distant one may hope, when the mastery of tuberculosis through internal therapeutics shall have been achieved.

Pyonephrosis, not associated with calculus nor tuberculosis, naturally calls at first for nephrotomy and drainage. This may be done without reference to the condition of the other kidney, and the earlier it is resorted to, after the symptoms of pus-retention have declared themselves, the greater the probability of retaining the affected viscus as a useful excreting organ, and the less the danger of the secondary involvement of the other kidney. I quite agree with the teaching that it is better to postpone removal till it has been demonstrated, by the lapse of time, that shrinking and final closure of the suppurating cavity will not follow the simple incision and drainage.

Before resorting finally to nephrectomy, a full determination of the condition of the other kidney must have been made, and only upon the demonstration of its competency will extirpation of the first one be proceeded with.

In the surgical practice of the present day further indications for nephrectomy are found in certain wounds and in malignant disease. Wounds of the kidney are to be treated just as wounds of any other tissue. The kidney wounded should be exposed and sutured or tamponed with a view to its preservation, if possible. A portion of its substance may be excised, but if it is much lacerated or disorganized, or if the control of bleeding has required the ligation of the renal artery, a complete extirpation of the organ must be made.

Cancers of the kidney present the same problems and respond to extirpation in the same degree as do cancers of other organs of the body. It is often the case that the carcinomatous degeneration begins and extends far without provoking special symptoms to indicate its presence, so that in the case of an internal organ, such as the kidney, by the time when the disease has become recognizable, the period when it was confined within the organ primarily affected and is susceptible of absolute removal has passed by, and the most that a surgeon can do is, by the extirpation of the primary growth, to secure relief from the pains and disabilities incident to its presence in the original location, while the dissemination and advance of the disease elsewhere are progressing to its fatal end. A very large operative mortality-rate has thus far attended the efforts at nephrectomy for carcinoma, for the reason that the patients have not presented themselves for operation, or their need for operation has not been realized, until the involvement of the perirenal tissues has become so great as to render the enucleation or separation of the mass of gross disease exceedingly difficult and most formidable as an operative procedure, while the resisting power of the patient has become reduced to a minimum. Still, in view of the absolute picture of hopelessness and great present suffering of such cases, attempts to relieve them operatively are eminently justifiable. No more brilliant achievement in surgery has been recorded than the successful efforts of Abbe in the

removal of sarcoma of the kidney. In this case a sarcomatous kidney weighing seven pounds was removed from an infant, whose weight after the removal of the tumor was but fifteen pounds. This child is still living, more than seven years later, and is in perfect health. Similar immunity from recurrence, after the removal of kidneys the subject of malignant disease for periods of from three to five years, have been reported by Dönderlein, Israel, and Schmidt.¹ One such success with its later permanent freedom from recurrence is sufficient to encourage surgeons to continue their attempts to remove cancerous kidneys, notwithstanding the little advantage which in most cases rewards their labor.

Thus much as to the general features merely of only one part of my theme,—viz., nephrectomy. But during the twenty years of this brilliant surgical epoch closing the nineteenth century the conservative surgery of the kidney has been developed to quite as marked a degree as the destructive surgery. All that has been done for the fixation of movable kidneys and the relief of the pain and disability so often attending that condition dates its beginning from 1881, when Hahn, of Berlin, published his first few cases of lumbar nephropexy.² The opening of an otherwise healthy kidney and the removal from its interior of a calculus, with preservation of the organ, was first done by Morris, of London, in February, 1880.³ The possibility of relief of nephralgia, simulating nephrolithiasis, by free division of the capsule of the kidney, with or without incision into the substance itself of the organ, was suggested by Tiffany, of Baltimore,⁴ in 1885, and demonstrated by the same surgeon two years later.⁵ The value of the procedure has been verified by the experience of many other surgeons. Plastic operations on the pelvis of the kidney

¹ Heresco, *De l'Intervention Chirurgicale dans les Tumeurs Malignes du Rein*, Paris, 1899.

² Hahn, *Die operative Behandlung der beweglichen Niere durch Fixation*, *Centralblatt für Chirurgie*, 1881, No. 29.

³ Morris, *British Medical Journal*, 1880, ii.

⁴ Tiffany, *Transactions American Surgical Association*, 1885, p. 134.

⁵ Tiffany, *Transactions American Surgical Association*, 1887, p. 167.

for the relief of valvular obstruction to the inlet to the ureter, producing intermittent hydronephrosis, is of still later origin, being due to the work of Fenger,¹ of Chicago, and of Mynter,² of Buffalo, so late as 1893.

The methods of diagnosis have improved *pari passu* with the extension of operative indications and the perfection of operative technique. Surgeons have learned to better interpret subjective symptoms. Kidney abscesses are less frequently lost sight of under the mistaken cloak of typhoid or malarial fever; the gastric crises and abdominal distress of a downward dragging kidney are less frequently classified as digestive and neuralgic manifestations, the bleeding and tenderness of a calculous kidney are less frequently referred to intrinsic circulatory disturbances. For the discovery and analysis of objective symptoms the senses, the arts, and the sciences have all been brought into requisition. Chemistry has lent its test-tubes and reagents, Optics its microscope and reflecting mirrors, Physics its centrifugator, Biology its guinea-pigs and dogs for the injection of suspicious sediment, Bacteriology its plates and incubators, Mechanics its catheters and cystoscopes and segregators, and Electricity its light for the illumination of the hidden outlets of the ureters and for the development of the rays of Röntgen, while, for the preservation of the shadows which these develop, Photography has brought its most sensitive plates. Over and above all these material aids to direct them with eye and hand, and to interpret their results have arisen observers trained, skilful, judicious. The natural result has been an earlier and more correct appreciation of the existence of the conditions calling for surgical interference in so hidden and deep-lying an organ as the kidney, and following upon this a greater degree of success in dealing with them. To this witness the fact that of the 233 cases of nephrectomy collected by Gross, in 1885, in 104 of them death was the result, a mortality-rate of nearly 45 per cent. ! But the most recent statistics of a great clinic here, in New York, the

¹ Fenger, Chicago Medical Record, March, 1893.

² Mynter, ANNALS OF SURGERY, December, 1893.

Roosevelt,¹ give as the result of the thirty-two nephrectomies done in the period from 1890 to 1898, inclusive, but six deaths,² a mortality-rate of less than 19 per cent. Even more suggestive as to the possibilities of interference in selected cases are the figures of the Presbyterian Hospital,³ where of the seventeen consecutive nephrectomies done in the period from 1893 to 1896, *all* recovered, the mortality-rate was zero!

The future extension and most beneficent results of renal surgery depend upon the perfection of the methods of diagnosis, whereby the surgical diseases of the kidneys shall be detected in their earlier stages. Questions of operative technique enter but little into the discussions of the present moment. The trained judgment of the experienced surgeon, with all the resources of the thoroughly furnished clinic at his command, is but little troubled as to location, direction, or extent of his incisions. Having clearly in his mind the condition with which he is dealing, and the work which he is to accomplish, he proceeds straight to his end, exposing quickly and fully the seat of disease, controlling hæmorrhage, limiting shock, avoiding infection, and completes his work thoroughly, influenced as to the details of his procedures more by the particular conditions of the individual case than by the directions of authorities. In renal surgery the matter which most engages the surgeon's thought is the demonstration of the existence of the disease in the particular organ; next comes the question, What is the condition of the other kidney? To the perfection of methods whereby with facility and positiveness these questions can be answered the learning and ingenuity of surgeons may well be given. In this direction to-day lie the remaining problems of the surgery of the kidneys.

LEWIS STEPHEN PILCHER.

¹ Johnston, *ANNALS OF SURGERY*, March, 1889, p. 339.

² Of these six deaths three were in cancer cases, a fourth was in the person of a man already nearly moribund through internal bleeding from a ruptured kidney, the fifth was already in a state of desperate prostration from sepsis, and in the sixth case the kidney that was left proved to be already destroyed by disease. (See Johnson's Report, *loc. cit.*)

³ Hawkes, Presbyterian Hospital Report, 1897, p. 234.